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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 :
A47C 23/06 // A47C 31/12
A61G 7/04

A1

(11) International Publication Number: WO 85/ 02987

(43) International Publication Date: 18 July 1985 (18.07.85)

(21) International Application Number: PCT/FI85/00002

(22) International Filing Date: 3 January 1985 (03.01.85)

(31) Priority Application Number: 840024

(32) Priority Date: 5 January 1984 (05.01.84)

(33) Priority Country: FI

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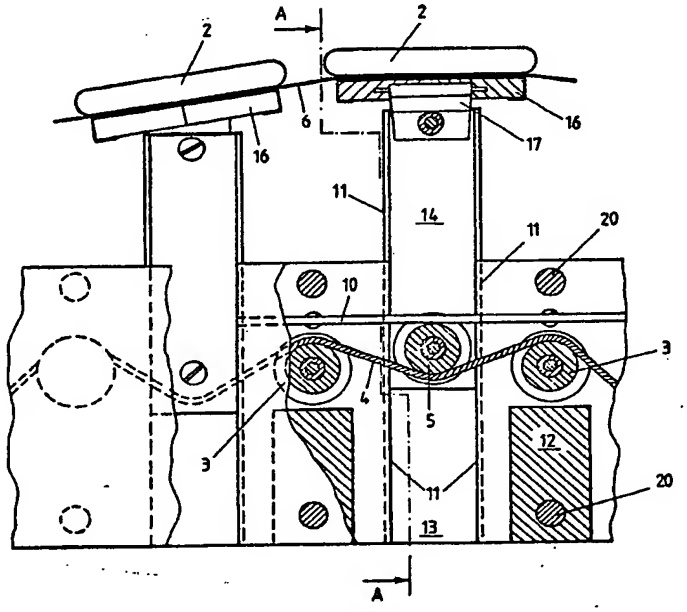
(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE, DE (European patent), DK, FI, FR (European patent), GB, GB (European patent), LU (European patent), NL (European patent), NO, SE, SE (European patent), SU.

Published
With international search report.
In English translation (filed in Finnish).

(54) Title: SELF-ADAPTING LATH BOTTOM

(57) Abstract

Self-adapting lath bottom for example for beds and chairs, said lath bottom having at least two frame beams (1), to which are attached with bearings rope sheaves (3) over which run ropes (4) supporting, with the help of other rope sheaves (5) and support members (14), laths (2) connected with one another. It is the intention of the invention to bring about a steady and reliable lath bottom and its rope apparatus. In a lath bottom structure in accordance with the invention, the frame beam (1) consists of a minimum of two adjoining, parallel plates (13), of which the gap is fitted with support rope sheaves (3) and other ropes sheaves (5) made to move with the bottom ends of the support members (14) between the frame plates only in a vertical direction or in a corresponding direction if the frame beam (1) is in a position other than horizontal.



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Self-Adapting Lath Bottom

The subject matter of the invention is a self-adapting lath bottom for example for beds and chairs, said lath bottom having at least two frame beams, to which are attached with bearings rope sheaves over which run ropes supporting, with the help of other rope sheaves and support members, laths connected with one another.

The bottom structure of a bed and seat utilizing a lath bottom with rope sheaves is previously known from the PCT publication 83/01563 and references cited therein, in which is illustrated the operating principle of the lath bottom with rope sheaves. The use of the already described lath bottom with rope sheaves has been limited by its frame structure, especially in double beds and seats, as the laths are attached by their ends via rope sheaves in between the frame structure, leading in practical use to a situation where, when the laths are depressed to the space between the frame beams, the top edge of the frame remains at an uncomfortably high level especially at those points where the depression is substantial. When a double bed is constructed using this frame structure, the frame structure constitutes an uncomfortable ridge between the users. Moreover, the ridge may be located at different positions depending on the measurements of the users. The inconvenience caused by the frame

structure can be alleviated by covering the frame with a soft material or by strengthening the softening part on top of the laths. However, this leads to an impairement of the operation of the lath bottom with rope sheaves. Operation of the lath bottom is also impaired by the behavior of individual laths under load. As the laths are not tied to one another, and as the tilt angle of a lath is not dependent on that of an adjacent lath, it can occur in practical use, eg. when sitting on the edge of the bed, when getting to or from the bed, that the differences in height between loaded and non-loaded laths cause a dangerously wide gap to occur between them, wide enough for example for one's hand to accidentally get in, together with the softening part.

A lath bottom in accordance with the U.S. Publication 3717376, Figure 9, is perhaps closest to the present invention. In the invention mentioned, the attachment of the pulley and cord apparatus to the frame poses a problem. The support of the lath bottom by the cord pulleys is unstable. Additional problems may be caused by the accumulation of impurities.

A structural solution in accordance with the present invention solves the above-mentioned problems and gives a more practical form to the lath bottom, improves the ventilation of the bed, as the softening part can be made less thick and realized on a lath-per-lath basis. Additionally, it is intended that the structure of the lath bottom be made solid and in such

a way that it functions without interference.

In order to realize the above-mentioned type of operation, and to enhance operability, the present invention is mainly characterized by what is stated in the characterizing clause of Claim 1.

The mode of operation in accordance with Claim 3 renders the use of bearings reliable and inexpensive from a manufacturing point of view. Moreover, the V-shaped gliding surfaces guarantee an operation without interference.

In practice, trasporting the bed or the chair necessitates an easily collapsible structure. The mode of operation in accordance with Claim 4 makes this possible.

In the following, the invention is explained in more detail with reference being made to the attached figures illustrating one application of the invention.

Figure 1: General structure of the lath bottom bed in accordance with the invention, shown from top, side and front.

Figure 2: Side view and partial cross-section of the frame beam and positioning of rope sheaves for the laths.

Figure 3: Cross-sectional view of the frame beam.

Figure 4 and 5: Side view, partially cross-sectional, of the lath and support member.

Figures 6 and 7: Partly cross-sectional front view of lath and support member.

Figure 8: Slide attachment of the supporting member to the link in the lath.

As shown in Fig. 1, the lath bottom with ropes

consists of two support beams 1, which are attached via the fastening piece 7 to the end plate 8, which has the fastening and adjustment comb 9 for the rope 4. The end plate 8 is used to attach the lath bottom to the frame structure of the bed. Between the guide plates 12 inside the support beams 1 there moves the lath rope sheaf 5, being supported by the rope sheaf 3 and the rope 4. The laths 2 attached to the lath rope sheaves are tied to one another with the flexible band 6 at the attachment point of the lath 2, ie. at the point of the support beams 1. The distance of the support beams 1 from one another is smaller than the length of the laths 2.

The lath bottom adjusts itself via the combined effects of the rope sheaf system 3, 4, 5 and the band 6. When the laths 2 are tied with one another using the flexible connecting band 6 so as to leave the flexible connecting band somewhat loosely between the laths 2, the self-adaptation of the laths 2 takes place as follows. When the laths 2 are depressed by a load, the flexible connecting band 6 pulls the adjacent laths 2 downwards while simultaneously tilting them. This prevents the rope 4 from exercising an elevating effect on the adjacent lath 2 in excess of what the flexible connecting band 6 allows for, transferring its elevating effect on the further laths 2. When the adjacent lath 2 tilts under the influence of the flexible connecting band 6, it elevates the next unloaded lath 2 with the help of the flexible connecting band 6, thus assisting

the elevating effect of rope 4 on the laths further and further removed. Simultaneously, the lath bottom adjusts flexibly.

The connecting band 6 is only slightly wider than the frame beam 1, which means that it protects the parts inside the frame beam 1 from impurities yet maintains fully the free ventilation of the lath bottom.

The support beam 1 can be constructed, as shown in Fig. 2 and 3, with two frame plates 13, or with three frame plates. With an increase in the number of laths, the laths become correspondingly narrower and the lath bottom adjusts better. A three-plate construction can be realized such that support members in the same row support every other lath and the laths in between are supported by the adjacent row of support members installed between the frame plates. For the support rope sheaves, there remains the space, amounting to the length of a lath, between the frame plates, meaning that double the number of narrower laths can be accommodated as compared to a two-plate structure using an identically sized rope sheaf apparatus.

Fig. 2 and 3 show the structure of the lath rope sheaf 5 and of the support rope sheaf 3 and their installation in the support beam 1, and the attachment of the flexible band 6 to the lath 2.

The support member 14 consists of two support plates 14. The rope sheaf 5 is attached with a bearing to the bottom part of the space between the support

plates 15, the top part featuring a bearing-attached swing hinge. The rope sheaf 5 and the swing hinge 17 are attached via the bearing tubes 21 and the screws 19 to the support plates 14 such that the length of the bearing tube 21 determines the distance between the support plates 14 when they are pressed against the ends of the bearing tube 21. The attachment of the lath 2 to the swing hinge 17 is explained below.

On the edges of the support plates 14, there are the V-ridges 11, which are fitted to the corresponding V-ridges 11 at the edges of the intermediate piece 13. The guiding surface of either the intermediate piece 13 or of the support plates 14 is covered with a metal plate while the other part is made of plastic. Thus, an impeccable slide fitting 11 is realized between the support plates 14 and the intermediate piece 12. From the viewpoint of the attachment of the metal plate, a structure is advantageous in which the metal plate covers the side surfaces of the intermediate piece 12 and not only the V-ridges 11. The metal plate is attached to the frame with the same pins 20 as the intermediate piece 12 itself.

The intermediate piece 12 is a one-piece part and the support rope sheaf 3 is directly attached to it via a bearing. Assembly of the frame beam 1 is thereby realized quickly by inserting pre-assembled intermediate pieces 12 with their attachment pins 20 and support members 14, one after the other, on the frame plate 13 and by threading the rope 4 via the

sheaves 3 and 5 the total length of the frame beam 1. In order to prevent the lath rope sheaves from exiting, the steel wire 10 is additionally threaded through all the support members 14 and attached to the intermediate pieces 12. This done, the other frame plate 13 is positioned on top of the assembled structure, meaning that the pins 20 attach the frame plates 13 to one another. Of course, the method of assembly may differ from the one described in numerous ways.

The attachment of the lath 2 to the swing hinge 17 is realized with the help of the sliding attachment 15, as shown in Fig. 4 to 8. Under the lath 2, there is attached the link 16, which simultaneously fastens the flexible band 6 in between the lath 2 and the link 16. The swing hinge 17 is joined to the two-piece sliding plate 16 by pushing its rounded top end to the groove in the plate 16, thereby bringing about a hinge, as shown in Fig. 7. This hinge is necessary, as the lath 2 bends under load, the hinge adjusting itself to the bend.

The ease of transportation of the bed or chair as a whole and its easy assembly are largely based on the existence and use of the sliding attachment 15. The laths 2 tied with the band 6 constitute a lath carpet which can be rolled up and easily packaged.

The other parts are the frame beams 1 and the end parts 8 and possibly the additional parts of the frame structure. The frame beams 1 are pre-assembled such that they contain the rope sheaves and the support

member 14. Assembly is carried out by insertion of each of the sliding plates 16 of the attachment members 14 of each frame beam 1 into the link 18 of the corresponding lath 2. This done, the frame beams 1 can be joined with the help of the end plates 8 or some other frame structure. The back plate 22 in the link 18 prevents the laths 2 from escaping from their position on top of the frame beams 1. Of course, the slide structure can be realized in other ways as well, the most important consideration being that it exists.

Claims

1. A self-adapting lath bottom for example for beds and chairs, said lath bottom having at least two frame beams (1), to which are attached with bearings rope sheaves (3) over which run ropes (4) supporting, with the help of other rope sheaves (5) and support members (14), laths (2) connected with one another, characterized in that the frame beam (1) consists of a minumum of two adjoining, parallel plates (13), of which the gap is fitted with support rope sheaves (3) and other ropes sheaves (5) made to move with the bottom ends of the support members (14) between the frame plates only in a vertical direction or in a corresponding direction if the frame beam (1) is in a position other than horizontal.

2. A lath bottom in accordance with Claim 1, characterized in that the exit of the support member and the rope sheaf (5) at its bottom end is prevented from occurring with a limiting member (10) such as a thread (10) passing over the rope sheaves (5) or a rod fastened to the frame beam (1).

3. A lath bottom in accordance with Claims 1 and 2, characterized in that the laths (2) are joined one to the other at their ends with a flexible, slightly elastic band (6), of which the length between each pair of laths (2) is adjusted so as to limit the distance between the edges of the laths

(2) to a desired maximum measure.

4. A lath bottom in accordance with Claims 1, 2 or 3, characterized in that to the support member (14) belong two plates (14), between and on which the rope sheaf (5) is attached with a bearing and in that each two successive plates (14) feature in between them an intermediate piece (12) attached to the frame plates (13), said intermediate piece (12)

-- containing the support rope sheaf (3) including its bearings and

-- guiding the above-mentioned vertical travel of the support plates (14) and rope sheaves (5) with V-shaped gliding surfaces (11), which have been fashioned on the intermediate piece (12) or the surface plate assembled thereon and, correspondingly, on the edges of the support plates (14).

5. A lath bottom in accordance with Claims 1, 2, 3 or 4, characterized in that the fastening of the laths (2) to the support members (14) is realized with a sliding type attachment (15) parallel with the laths, fitted so as to make it possible to insert first, the slides (16) of the support members (14) assembled to the separate frame beams (1), into the links (18) in the laths (2), or the slides in the laths into the links in the support members, after which the frame beams (1) are tied one

to the other with the help of the rest of the support structure (7, 8).

6. A lath bottom in accordance with Claim 5, c h a r a c t e r i z e d i n t h a t the support member (14) features a joint-attached, bidirectionally swinging plate (16), which constitutes a slide and in correspondence to which the link (18) in the lath is fashioned.

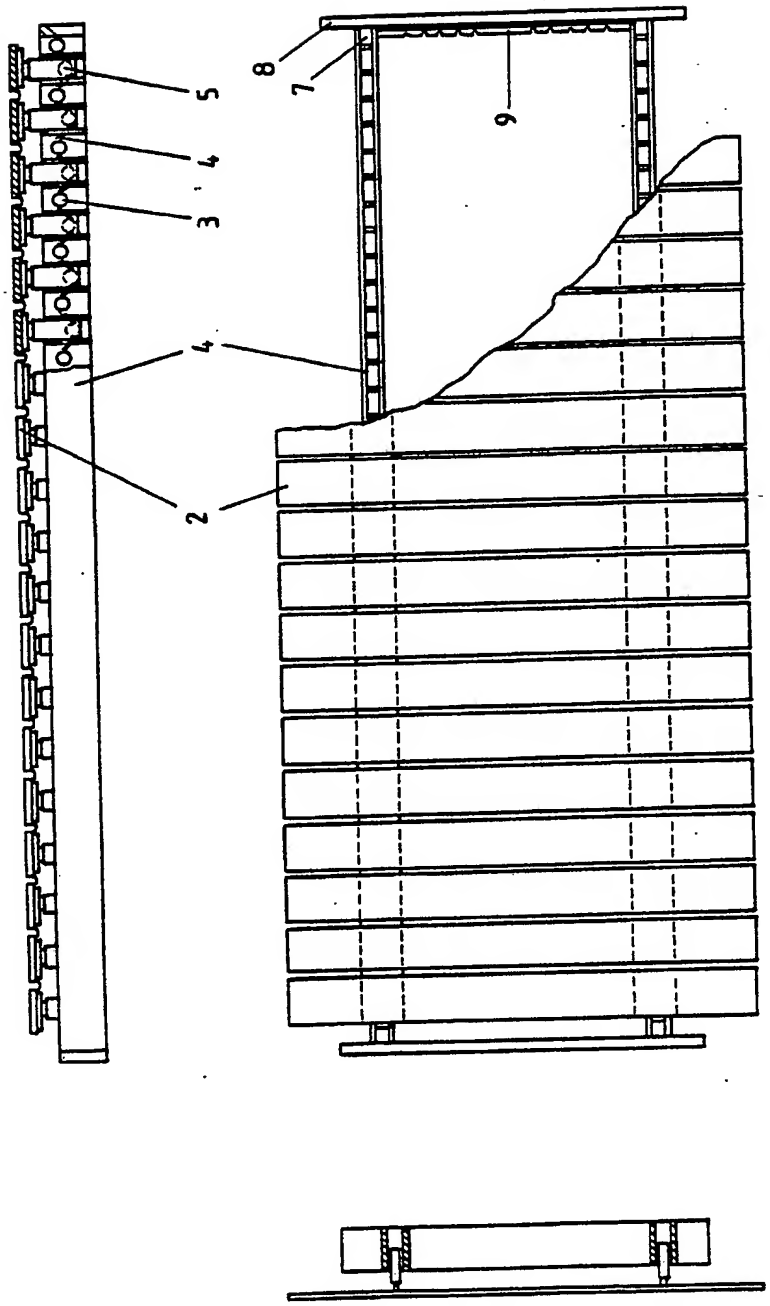
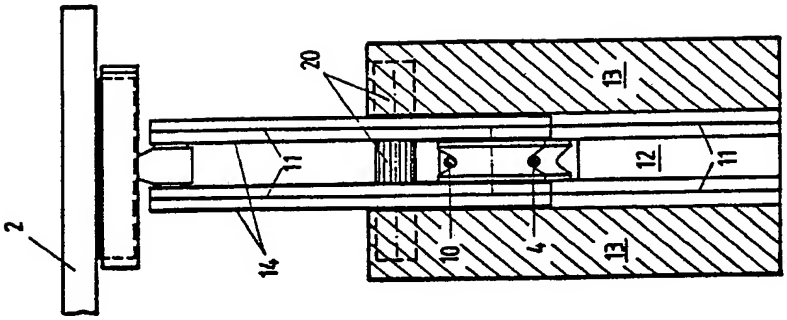


Fig 1.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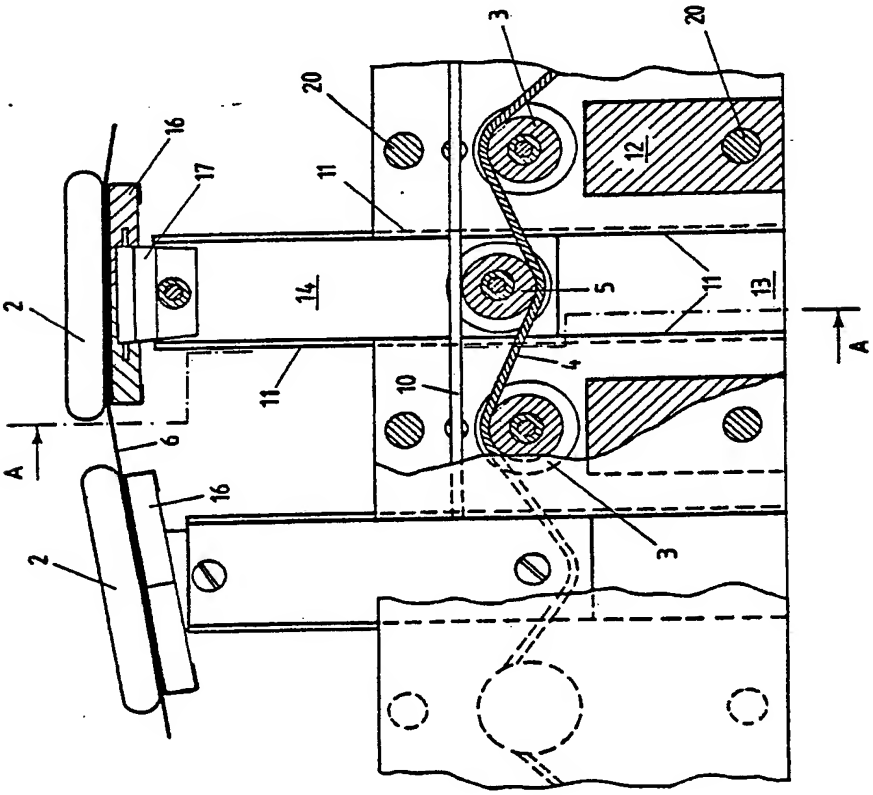
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Fig 2.

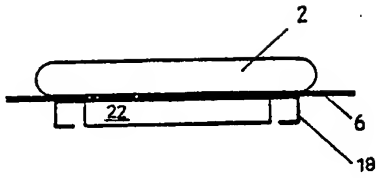

Fig 4.

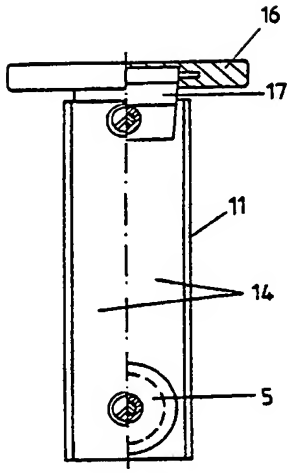

Fig 5.

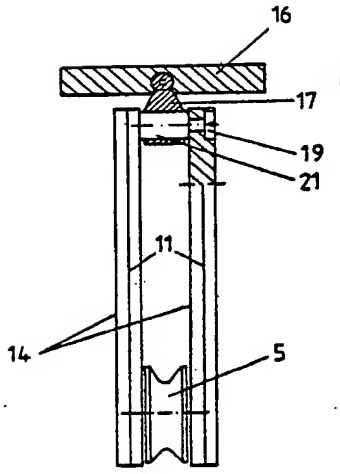

Fig 7.

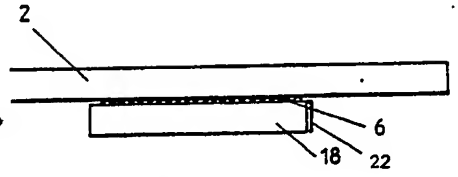

Fig 6.

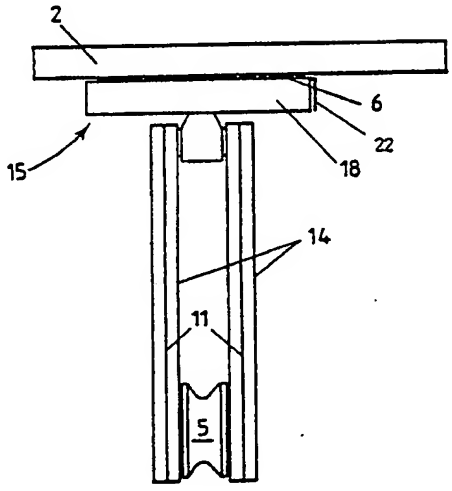

Fig 8.

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI85/00002

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC 4

A 47 C 23/06 // A 47 C 31/12, A 61 G 7/04

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC 4	A 47 C 7/14, 16, 23/00, 02, 06, 26, 31/12; A 61 G 7/04
US Cl	5:200-206, 236-246, 431-448

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	FR, A, 526 164 (G A PAPIN AND F MORIN) 3 October 1921	1, 3
Y	EP, A, 85 468 (B V AUPING) 10 August 1983 & NL, 8200401 JP, 59077852	1
Y	WO, A, 83/01563 (P M HAAPASALO) 11 May 1983 & EP, 0093135	1
Y	US, A, 2 532 425 (S W SCHENKER) 5 December 1950	1
Y	US, A, 3 717 376 (M LUTCHANSKY) 20 February 1973	1

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IV. CERTIFICATION

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